CAPITAL MARKETS DAY
JUNE 14-15, 2018 | PARIS CAMPUS, FRANCE

3DEXPERIENCE™

Olivier SAPPIN
Vice President, Transportation & Mobility
3DEXPERIENCE Value | Transportation & Mobility: Electric Vehicles
What are Transportation & Mobility executives saying about the future of their industry?
“Autonomous Car has to be simulated with billion of cases in computer ...”

Håkan Samuelsson, President & CEO, Volvo Car Group

“Car will no longer be a car: the car will be a robot, a data centre, a service, a digital companion”

Padmasree Warrior, NIO US CEO

“Depending on where you are in the world, the technical solution for autonomous driving will be different,”

Karl Iagnemma, cofounder & president of nuTonomy
Major impacts on Transportation & Mobility sector:

1. Increasing numbers of **New companies & New innovations** in the domain of Transportation & Mobility

2. Major **impact on existing Vehicle Architecture & technologies**

3. A **new approach** is required to develop **Mobility system** such as Autonomous Driving
1. Increasing numbers of New companies & New innovations in the domain of Transportation & Mobility

2. Major impact on existing Vehicle Architecture & technologies

3. A new approach is required to develop Mobility system such as Autonomous Driving
• Starting from scratch in 2016
• Complete Engineering team up and running with 3DEXPERIENCE platform
  • Global: 3 Geos
  • Online: double digit performance improvement
• End to End Engineering Coverage
• 3DEXPERIENCE Cloud selected to provide a global, secured and unified platform
• 2 weeks for 10 users to get acquainted with 3DEXPERIENCE
• better performance, data more secured, easy collaboration, data accessible from anywhere
Emblematic EV Startups are adopting 3DEXPERIENCE platform

100+ Startups created in 4 years
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VEHICLE ELECTRIFICATION | NEW TECHNOLOGICAL CHALLENGES

Stronger Systems Dependencies
Fast New Technologies Ramp-Up
Autonomous EV driving experience
New services & usage projection

-100 Years
5 years

Engineering Maturity

VEHICLE ELECTRIFICATION

NEW TECHNOLOGICAL CHALLENGES

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VEHICLE ELECTRIFICATION

NEW TECHNOLOGICAL CHALLENGES

Full Vehicle

ICE Powertrain

Interiors

Chassis

Body

RETHINK

VEHICLE ENGINEERING

VEHICLE EXPERIENCE
New systems represent new technological challenges

Battery
- Maintain temperature gradients < 2°
- Predict aging to keep low warranty costs
- New safety requirements

Electric Drive
- Thermal requirements (20k+ rpm, 800V)
- Electric ripples
- Packaging
- Manufacturability

Power Electronics
- DC/DC Dual tension in vehicle (high voltage + 12V)
- Mechanical and thermal stress
- Power and Signal Integrity: Electrical ripples

HVAC
- Optimize energy required to preserve battery charge
- Optimize entire vehicle thermal behavior

Chassis
- New vehicle dynamics due to low center of gravity
- High modularization opportunities (battery modules, motors by axle or at wheels)

Vehicle Architecture / Body
- Minimize weight
- New configuration and packaging opportunities
3DS is investing in key technologies for Vehicle Electrification

- **Electric Drive Engineering**
- **Power Electronics Engineering**
- **Battery Engineering**
- **Full Vehicle Integration**
- **Air Cooling**
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Transportation & Mobility System Architecture

Mobility Architecture

Transportation & Mobility context and usages

Vehicle Architecture

Car systems
- Structure, powertrain, surrounding camera...

Embedded software systems
- Autonomous intelligence, sensing & responsive systems

Hardware centric sub-system

Software centric Sub-system
Imagine, Test & Deliver new Mobility Experiences

Vehicle Electrification

Driving Automation

Connected & Shared Mobility

>> Improve electric car performances from material modeling to battery to vehicle

>> Deliver safe driving experience by connecting software & hardware disciplines

>> Learn from product usage data to continuously improve products & services
Dassault Systèmes provides business & people with 3DEXPERIENCE universes to imagine sustainable innovations capable of harmonizing product, nature and life.

“Thank you"